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In re Application of:	Lam, et al.
Application No.:	09/692,084
Filed:	October 19, 2000
For:	**MULTIMEDIA ADAPTIVE SCRAMBLING SYSTEM (MASS)**
Examiner:	B. Lanier
Art Unit:	2132

Mail Stop: Appeal Brief - Patents
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[**X**] Appellant's Brief, in triplicate;

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Attorney Docket No.: **SOL-130**

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY DOCKET NO.: SOL-130

In re Application of:	)
	)
Lam, et al	) Examiner: B. Lanier
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Serial No.: 09/692,084	) Art Unit: 2132
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APPELLANT'S BRIEF (37 C.F.R. 1.192)

This brief is in furtherance of the Notice of Appeal filed in this case on July 1, 2004.

The fees required under §1.17, and any required petition for extension of time for filing this brief and fees therefor, are accounted for in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief is transmitted in triplicate (37 C.F.R. 1.192(a)).

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. 1.192(c)):

(1) REAL PARTY IN INTEREST (37 C.F.R. 1.192(c)(1))

The real party in interest in this appeal is: Verance Corporation, a California Corporation having its principal place of business at 10145 Pacific Heights Boulevard, Suite 200, California 92121, the assignee of a 100% interest in the application.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

(3) STATUS OF CLAIMS

The status of the claims in this application is:

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

There are 22 claims pending in the application. The pending claims are claims 1, 3-5, 7-12, 14-16, and 18-26.

B. STATUS OF ALL THE CLAIMS

1. Claims canceled: 2, 6, 13, and 17.
2. Claims withdrawn from consideration but not canceled: none
3. Claims pending: 1, 3-5, 7-12, 14-16, and 18-26.
4. Claims allowed: none
5. Claims objected to: 22
5. Claims rejected: 1, 3-5, 7-12, 14-16, and 18-21, and 23-26.

C. CLAIMS ON APPEAL

The claims on appeal are: 1, 3-5, 7-12, 14-16, and 18-21, and 23-26.

(4) STATUS OF AMENDMENTS

Applicants mailed an Amendment on November 20, 2003 in response to the September 24, 2003 Office Action. Claims 1, 7, 8, 12, 18, 19, 23, and 24 were amended by this Amendment, which was entered by the Examiner.

A previous Amendment, which was entered, was mailed on August 18, 2003. This Amendment amended claims 1, 7, 8, 12, 18, 19, 23 and 24 and cancelled claims 2 and 13. Claims 25 and 26 were added.

A previous Amendment, which was entered, was mailed on May 20, 2003. Claims 1, 7, 8, 12, 18, 19, 23 and 24 were amended and claims 6 and 17 were cancelled.

(5) SUMMARY OF INVENTION

The technical problem addressed by the present invention is to provide for scrambling of digital data samples such that the content of the samples is degraded but still recognizable. This problem is solved by the structure set forth in Applicants' claims, as follows:

Claim 1: *"A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs)"*

Referring to Applicants' Figure 1, the invention relates to the field of data scrambling. Digital samples (e.g., sample 115) of an original waveform 110 each include a plurality of bits,

including least significant bits (LSBs) and most significant bits (MSBs). Certain bits of the sample are scrambled in order to protect the content from illicit use (see, e.g., Applicants' specification, page 10, line 20 through page 11, line 28). Figure 3 shows a simplified data scrambler used to implement the method of claim 1, while Figure 5 shows a detailed data scrambler in accordance with the claimed invention.

The method according to claim 1 comprises the steps of:

"determining a dynamic range defined by a most significant non-zero data bit of each sample;"

Referring to Applicants' Figure 1, and the specification, page 10, lines 26 through page 11, line 3, each sample has a dynamic range which is defined by the most significant non-zero bit of the sample. In the example shown in Figure 1, the dynamic range for each sample may be between zero and twenty-four bits. For example, the dynamic range of sample 115 of Figure 1 is 18 bits (specification, page 11, lines 8-9). The dynamic range may be determined by a range detector 535 as shown in Figure 5.

"adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;"

As shown in Figure 1, the selected number of LSBs to be scrambled may be adaptively selected based on the dynamic range of the sample. In particular, the specification indicates that the number of bits which are not modified (e.g., the Most Significant Bits (MSBs)) may be inversely proportional to the maximum dynamic range of the sample (specification, page 11, lines 21-25).

"scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples;"

The LSBs that are selected for scrambling are scrambled with a scrambling key, as described on page 13, lines 14-21. The scrambling key may be produced by a scramble key generator 310 as described on page 15, lines 15-19 and shown in Figure 3. A number of MSBs of each sample are preserved, as shown in Figures 1 and 2a and described on page 11, lines 15-25 and page 14, lines 2-9. An example of a scrambled sample 250 having preserved MSBs ($S1_7$, $S1_6$, and $S1_5$) and scrambled LSBs ($S1_4$, $S1_3$, $S1_2$, $S1_1$, and $S1_0$) is shown in Figure 2a.

"wherein: the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable."

As only a selected number of LSBs are scrambled in accordance with the dynamic range of the sample, a portion of the dynamic range of the sample is preserved. In other words, the sample is not scrambled over its entire dynamic range, only over a portion of the dynamic range. Therefore, the sample can be scrambled so that the content is degraded but still recognizable (specification, page 12, lines 24-28).

Claim 3: *"wherein the samples are provided in successive frames, comprising the further step of:"*

As shown in Figure 1, the samples may be provided in successive frames (e.g., Frames A, B, and C of Figure 1). In Figure 1, each frame has 15 samples (page 10, lines 20-23).

"adaptively selecting the number of LSBs to be scrambled in each sample according to the frame thereof"

The number of LSBs to be scrambled in each frame may be selected according to the frame the sample is positioned in. Put another way, the number of MSBs to be preserved (not modified) in each frame may be adaptive (page 11, lines 15-28). Each data sample's M most significant bits can be preserved, and all other bits may be modified (page 8, lines 5-8). In Figure 1, for Frame A, M=2, for Frame B, M=3, and for Frame C, M=2. Therefore, 2 MSBs are preserved in Frames A and C, while 3 MSBs are preserved in Frame B (Page 11, lines 18-20).

Claim 4: *"said scrambling key is a pseudo-random scrambling key."*

The scrambling key used to scramble the selected LSBs may be a pseudo-random scrambling key, as described on page 14, lines 20-22.

Claim 5: *"in said scrambling step, the number of LSBs are scrambled within the same sample using intra-sample scrambling."*

Scrambling of the selected number of data bits can be performed within the same sample (intra-sample scrambling) as shown in Figure 2a (page 13, lines 9-10 and page 13, line 27 through page 14, line 9).

Claim 7: *"A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:*

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable;"

The determining, adaptively selecting, and scrambling steps of claim 7 correspond to the steps of claim 1 described above.

"in said scrambling step, the selected number of LSBs are scrambled between different samples, and within the same sample, using inter-sample and intra-sample scrambling, respectively."

A combination of intra-sample scrambling and inter-sample scrambling can be used to scramble the selected number of LSBs of each sample (page 13, lines 13-14). Figure 2a shows an example sample 250 obtained using intra-sample scrambling and Figure 2c shows samples 200', 260', and 270' where the selected LSBs were subject to inter-sample scrambling.

Claim 8: *"A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:*

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable;"

The determining, adaptively selecting, and scrambling steps of claim 8 correspond to the steps of claim 1 described above.

"in said scrambling step, the selected number of LSBs are scrambled between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight."

In horizontal inter-sample scrambling, bits of the same weight are interchanged among the samples as shown in Figures 2b and 2c. For example, bit $S1_0$ of sample 200 and bit $S3_0$ of sample 270 are exchanged, bit $s1_2$ of sample 200 and bit $S2_2$ of sample 260 are exchanged, etc., to form scrambled samples, 200', 260' and 270' (page 14, lines 10-19; Figures 2b and 2c).

Claim 9: *"embedding the scrambling key, at least in part, into the scrambled samples for use at a decoder in descrambling the scrambled samples."*

The key used to scramble the sample may be embedded in the scrambled sample for use in descrambling the sample at the decoder. This protects the key before and after the sample is descrambled (page 15, lines 4-14). For example, the scramble key may be encoded as auxiliary data in the waveform carrying the samples (page 16, lines 1-5). A scramble key encoder 340 shown in

Figure 3 may be used to encode the scramble key into the waveform carrying the samples, to provide the waveform with the embedded scramble key (page 15, line 29 through page 16, line 1).

Claim 10: "*the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a previous frame of samples.*"

The scramble key may be provided to a key buffer 320 as shown in Figure 3, which stores the key, e.g., for one frame. In this manner, the key for scrambling a current frame may be embedded in the previous frame (page 15, lines 20-23).

Claim 11: "*the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a current frame of samples.*"

The scramble key may be provided directly from scramble key generator 310 to scramble key encoder 340 in order to embed the scramble key into the current sample, as shown in Figure 3.

Claim 12: "*A method for descrambling previously scrambled digital samples of content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs)*"

Claim 12 sets forth a method for descrambling which is analogous to the method for scrambling set forth in claim 1. Figure 4 shows a data descrambler/decoder 400 for descrambling the scrambled waveform produced by the scrambler/encoder of Figure 3. A more detailed version of a data descrambler is shown Figure 6 (which corresponds to the data scrambler shown in Figure 5).

The descrambling method of claim 12 comprises the steps of:

"determining a dynamic range defined by a most significant non-zero data bit of each sample;"

The descrambling step of determining the dynamic range of the sample is analogous to that of claim 1. As shown in Figure 6, a range detector 535' can be used to determine the dynamic range of the sample, which is analogous to the range detector 535 of the data scrambler shown in Figure 5.

"adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;"

The adaptive selection of the LSBs to be descrambled is analogous to the claim 1 step of adaptively selecting the number of LSBs to scramble (page 20, lines 22-25).

"descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples;"

The scramble key may be decoded from the scrambled sample by scramble key decoder 410 shown in Figure 4, using techniques corresponding to those of the scramble key encoder 340 shown in Figure 3 (Page 16, lines 16-21). This scrambling key may be used to descramble the reordered LSBs and restore their positions within the samples (page 20 line 28 through page 21 line 11; and Figure 6).

"wherein: the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable."

As discussed above in connection with claim 1, the samples are scrambled so that the content is degraded but still recognizable (specification, page 12, lines 24-28).

Dependent **Claim 14** is analogous to claim 3.

Dependent **Claim 15** is analogous to claim 4.

Dependent **Claim 16** is analogous to claim 5.

Independent **Claim 18** is analogous to claim 7.

Independent **claim 19** is analogous to claim 8.

Claim 20: *"wherein the scrambling key is embedded into the scrambled samples, comprising the further step of:*

recovering the scrambling key from the scrambled samples for use in said descrambling step."

A scramble key encoder 340 as shown in Figure 3 may be used to embed the scramble key into the waveform carrying the samples as discussed above in connection with claim 9. The scramble key may be recovered (decoded) from the scrambled sample by scramble key decoder 410 shown in Figure 4, using techniques corresponding to those of the scramble key encoder 340 shown in Figure 3 (Page 16, lines 16-21).

Dependent **Claim 21** is analogous to claim 10.

Claim 22: *"scrambling the scrambling key after descrambling the scrambled sample in said descrambling step."*

After using the scramble key to descramble the scrambled sample, the descrambler 430 can scramble the key so that it cannot be recovered by an attacker (page 16, line 29 through page

17, line 2). The Examiner has indicated that claim 22 contains allowable subject matter.

Independent **Claim 23** is the apparatus equivalent of method claim 1.

Independent **Claim 24** is the apparatus equivalent of method claim 12.

Claim 25: "*in said scrambling step, the number of LSBs are scrambled between different samples using inter-sample scrambling.*"

The selected LSBs can be scrambled between different samples. Figure 2c shows samples 200', 260', and 270' where the selected LSBs were subject to inter-sample scrambling (page 14, lines 13-16). Inter-sample scrambling may be performed by scrambler 330 shown in Figures 3 and 5.

Claim 26: "*in said descrambling step, the number of LSBs are descrambled between different samples using inter-sample descrambling.*"

The descrambling step is analogous to the scrambling step of claim 25. Descrambling may be performed by descrambler 430 shown in Figures 4 and 6.

(6) ISSUES

1. Whether claims 1, 3-5, 7-12, 14-16, 18-21 and 23-26 are anticipated under 35 U.S.C. § 102(e) by Katta (U.S. Patent 5,706,346) *(paragraph 4 of Final Office Action mailed on April 2, 2004).*

(7) GROUPING OF CLAIMS

The claims do not stand or fall together.

Claims 1, 3, 5, 7-12, 14, 16, 18-21, and 25 and 26 are believed to be separately patentable for the reasons discussed in the "ARGUMENT" section below.

Claims 4 and 23 fall if independent claim 1 falls. Claims 15 and 24 fall if independent claim 12 falls.

(8) ARGUMENT: REJECTIONS UNDER 35 U.S.C. §102(e)

(8)(1) Claims 1, 3-5, 7-12, 14-16, 18-21 and 23-26 are Not Anticipated Under 35 U.S.C. § 102(e) by Katta (U.S. Patent 5,706,346)

As mentioned above in the "Summary of Invention", Applicants' invention addresses the issue of how to scramble digital data samples such that the content of the scrambled samples is degraded but still recognizable.

Applicants recognizes that Katta is also concerned with a scrambling apparatus and descrambling apparatus, wherein descrambling and reproduction by unauthorized parties is not completely disabled, but is disabled to the extent that the content of unauthorized reproduction data is partially but not completely discernable (Col. 2, lines 7-13). However, the scrambling methods and apparatus (and the results achieved thereby) which are disclosed in Katta are substantially different than those which are claimed by Applicants.

An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein (see also, MPEP § 2131).

As discussed in detail below, Katta does not meet the requirements for an anticipation rejection.

(8)(1.1) Overview of Katta and Applicants' Invention

Schemes for communicating and storing digital data have become increasingly popular, particularly in the mass consumer market for digital audio, video, and other data. Consumers may now send, receive, store, and manipulate digital television, audio and other data content, such as computer games and other software, stock ticker data, weather data and the like. This trend is expected to continue with the integration of telephone, television and computer network resources (specification, page 1, lines 17-26).

However, in many cases it is desirable to control or monitor the use of such digital data. In particular, copyright holders and others with proprietary interests have the right to control the distribution and use of their works, including audio, video and literary works (specification, page 1, line 27 through page 2, line 3).

In a copyright management system where audio and video content are to be protected, it would be desirable to provide data scrambling to deter theft of the content while it is in transit. The distance of transit can be half way around the world, as with delivery on the Internet, or millimeters, such as within a DVD player's internal data transfer from disc to DAC (Digital to Analog Converter) (specification, page 2, lines 4-11).

However, it would be advantageous to scramble the data such that the content is degraded sufficiently so that it no longer has any significant commercial value, but, at the same time, is

perceptually satisfactory for use with player functions such as cueing and fast forward.

Applicants' claimed invention addresses the problem of how to scramble the digital data so that it is degraded and therefore of little value to a pirate, but still recognizable so that player functions such as cueing and fast forward can be enabled without unnecessarily descrambling the data beforehand. With Applicants' invention, selected least significant bits (LSBs) of the actual data samples are scrambled, while a number of most significant bits (MSBs) of the sample are preserved. The LSBs to be scrambled are selected in accordance with a dynamic range of the data sample. The dynamic range is defined by a most significant non-zero data bit of each data sample. By preserving a number of the MSBs of the sample, the scrambled sample will still be recognizable, although it will have little commercial value, due to the scrambling of the selected LSBs.

In the embodiment of Katta's system referenced by the Examiner (Final Office Action, page 3), dummy information is inserted into the MPEG header (meta data) fields. The dummy information, which replaces or modifies the original meta data, conveys slightly different information about the decoding parameters of the MPEG stream, such as a quantization width which is different from that used during the original quantization process (Col. 2, lines 35-50; Col. 12, lines 63-65). Therefore, if a decoder is not aware of the insertion of the dummy data, it will try to decompress the video frames using the wrong set of instructions (i.e., the wrong quantization matrix). The result of this decompression would be, for example, a warped or distorted picture. Only a decoder equipped with a signal detector 70 of Katta can recognize the presence of the dummy data and extract

the correct decoding parameters (see Katta, Column 12, discussion of "Descrambling Apparatus").

Katta uses a scrambling mode signal sm1 for selecting one or more of five scrambling modes. The different bits of the scrambling mode signal denote the different scrambling modes, and are not used to select which bits of the actual sample are scrambled. The scrambling mode selected by the scrambling signal sm1 is applied to the entire input signal of Katta.

For example, in Katta, the least significant bit of the scrambling mode signal sm1 defines quantization matrix scrambling (Col. 6, lines 60-67). With the quantization matrix scrambling of Katta, dummy information is inserted into the MPEG header of the signal to control the decoding process. A scrambling pattern signal sm2 defines which dummy pattern is to be used for the quantization matrix code (i.e., which dummy information will be inserted into the header information of the signal) (Col. 7, lines 14-53). As discussed above, decoding based on this dummy information will result in a distorted picture.

Katta does not disclose inserting dummy information into the actual data samples as is apparently assumed by the Examiner (final Office Action, page 3). Rather, the dummy information of Katta is inserted into the MPEG header. In Applicants' claimed invention, dummy information is not used in the scrambling process (either to modify the MPEG header or the data itself).

It is noted that Applicants' claims relate to protecting and/or descrambling of "digital samples of content" wherein only portions of the samples of the digital content are scrambled or descrambled. In other words, with Applicants' invention, only a selected number of bits, in particular, a selected number of least significant bits (LSBs), are scrambled. Therefore, the

remaining bits are preserved. By preserving certain of the bits of the digital sample and scrambling only selected bits, the samples are degraded but still recognizable.

(8)(1.2) Discussion of Final Office Action and Examiner's Response to Arguments

Applicants' respectfully submit that the Examiner has mischaracterized Applicants' arguments in the Response to Arguments section of the final Office Action (final Office Action, page 3). In the Response to Arguments section the Examiner states: "*Applicants' argument that the Katta reference does not disclose inserting dummy information into the actual data samples is not persuasive because this limitation is not present in the current claims*" (final Office Action, page 2, paragraph 1). Applicants', in response to the previous Office Action mailed on December 11, 2003, argued that Katta disclosed inserting dummy information in the MPEG header to convey different compression and coding parameters, but that Katta did not disclose the insertion of dummy data into the data samples as the Examiner apparently assumed in the December 11, 2003 Office Action. Applicants' did not argue that the present invention involved the insertion of dummy data as part of the scrambling process.

With Applicants' claimed invention, no "dummy information" is used in the scrambling process. Selected LSBs from the actual data samples are scrambled (i.e., re-arranged) within the sample (intra-sample scrambling) or among different samples (inter-sample scrambling). No additional "dummy" information is used in Applicants' scrambling process.

In addition, the Examiner continues to mischaracterize the term "dynamic range" as used in Applicants' claims. In the Response to Arguments section of the final Office Action, the Examiner states: "*Applicant's argument that the Katta reference does not disclose determining a dynamic range of each sample of digital content, where the dynamic range is defined by a most significant data bit of the data sample is not persuasive because with the dynamic range of Applicant's was defined by Mr. Lipsitz, in the interview held 13 November 2003, as being significant with respect to value rather than bit position and Katta discloses scrambling occurs so that only relevant data is scrambled (Col. 10, line 53 - Col. 12, line 11)*" (final Office Action, page 2, paragraph 2).

Katta does not mention the term "dynamic range." The term "dynamic range" is defined in the field of digital video signals to be:

> The number of colors or shades of grey that can be represented by a pixel. The smallest unit of data stored in a computer is called a bit. Dynamic range is a measurement of the number of bits used to represent each pixel in a digital image. 1-bit or bitonal means that a pixel can either be black or white. Bitonal imaging is good for black and white images, such as line drawings and text. However, scanning in grayscale rather than bitonal may produce a better looking image. 8-bit color or 8-bit grayscale means that each pixel can be one of 256 shades of color or one of 256 shades of gray. 24-bit color means that each pixel can be one of 16.8 million colors.
>
> www.coloradodigital.coalliance.org/glossary.html

As discussed in Applicants' specification, the term "dynamic range" as used in Applicants' claims relates to the amplitude of

the digital sample. For example, Figure 1 shows successive data samples, each sample containing twenty-four bits. The dynamic range of each sample is a property of the sample that is defined by the most significant non-zero bit (not including the sign bit) of the sample. In Figure 1, the sample 115 has a dynamic range of 18 bits (page 11, lines 8-14). The number of LSBs to be scrambled for each sample may be adaptively selected based on the dynamic range of the sample. In particular, the number of bits which are not modified may be inversely proportional to the maximum dynamic range of the sample (specification, page 11, lines 21-25). For example, with Applicants' invention, more LSBs can be scrambled in a sample having a large dynamic range than in a sample having a smaller dynamic range while still providing a degraded but recognizable sample.

The Examiner has apparently equated the term "dynamic range" as used by Applicants with Katta's selection of a scrambling mode based on the dummy information in the MPEG header. In Katta, the entire signal is subject to processing by the selected scrambling mode, and there is no selection of relevant data to scramble in Katta based on a dynamic range of a sample of the signal as assumed by the Examiner.

(8)(1.3) Discussion Of Final Office Action And Claim 1

Claim 1 is directed towards a method for scrambling digital content which recites the following steps:

- *determining a dynamic range defined by a most significant non-zero data bit of each sample;*
- *adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;*

- *scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:*
- *the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.*

Does Katta disclose determining a dynamic range defined by a most significant non-zero data bit of each sample?

The Examiner indicates that Katta discloses: "Upon determination of dummy data in the video data a switch is used to control the scrambling so that only the relevant data is scrambled (Col. 10, line 53 - Col. 12, line 11), which meets the limitation of determining a dynamic range of bits defined by a most significant non-zero data bit and scrambling the selected number of LSBs" (Office Action, page 3, paragraph 4).

However, there is no reference to the term "dynamic range" in Katta. The portion of Katta relied on by the Examiner discusses scrambling of data using scramble mode signal sm1 in connection with a scramble pattern signal sm2, which is substantially different than Applicants' claimed scheme.

In Katta, the scramble mode signal sm1 is a five bit signal which is used to select one or more of five different scrambling modes: the least significant bit of sm1 defines quantization matrix scrambling; bit 2 defines dct_type code scrambling; bit 3 defines alternate scan code scrambling; bit 4 defines DCT coefficient code scrambling; and bit 5 defines intra_dc_precision code scrambling (Col. 6, lines 58-67). Each bit of sm1 is set to "1" when the corresponding process is executed, and otherwise is

set to zero. For example, if sm1 is 00011, it is indicated that quantization matrix scrambling and dct_type code scrambling are effected (Col. 7, lines 1-9).

The scramble pattern signal sm2 is a six bit signal defining six different dummy patterns for the quantization matrix code as shown in Figures 4a-4F(Col. 7, lines 14-50). The dummy pattern identified in sm2 is inserted in the video signal at a position immediately after the "load_intra_quantizer_matrix" signal as a dummy intra quantized matrix data for the purpose of scrambling (Col. 7, lines 57-62).

A scramble position detector 1 of Katta has two one-bit memories 39 and 41 for storing internal scramble flags f1 and f2, respectively. When flag f1 is set to "1", it is indicated that no dummy intra_quantizer_matrix is inserted, but when f1 is zero, it is indicated that a dummy intra_quantizer_matrix is already inserted. Similarly, when flag f2 is set to "1", it is indicated that no dummy intra_quantizer_matrix is inserted, but when f1 is zero, it is indicated that a dummy intra_quantizer_matrix is already inserted (Col. 8, lines 42-51).

The cited portion of Katta relied on by the Examiner (Col. 10, line 53 - Col. 12, line 11) describes the selection of a scrambling mode via sm1 and the insertion of dummy data into the sequence header of the signal for scrambling purposes using signal sm2 (when the LSB of sm1 is set to 1, indicating quantization matrix scrambling). In Katta, even if an unauthorized party is able to descramble the signal, decoding of the signal based on this dummy information will result in a distorted picture.

Accordingly, Katta does not disclose or remotely suggest the determination of a dynamic range of each sample to be scrambled.

As discussed above, the dynamic range of each sample is a property of the sample which is determined by the most significant non-zero data bit of each sample. For example, sample 115 shown Frame A of Figure 1 has a dynamic range of 18 bits. An example of such a sample may be:

Sample 115 = $0_{23}0_{22}0_{21}0_{20}0_{19}0_{18}1_{17}0_{16}0_{15}1_{14}1_{13}0_{12}0_{11}0_{10}1_{9}1_{8}0_{7}0_{6}0_{5}1_{4}1_{3}0_{2}0_{1}0_{0}$,

The subscripts denote bit position, ranging from bit0 0_0 for the least significant bit to bit17 (1_{17}) for the most significant (leftmost) non-zero bit. Counting from bit 0_0, bit 1_{17} is the most significant non-zero bit, which is the 18^{th} bit in the sample. Therefore, sample 115 has a dynamic range of 18 (specification, page 11, lines 8-14).

No such determination of dynamic range is made for the sample to be scrambled in Katta. Rather, the scrambling mode of Katta is based on signals sm1 and sm2 which are independent of the signal to be scrambled.

Does Katta disclose adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor?

Katta does not disclose adaptively selecting a number of LSBs of a sample of a digital signal for scrambling in accordance with any property of the signal samples. In particular, Katta does not disclose or suggest the selection of a number of LSBs of each sample of a signal to scramble, as claimed by Applicants. Further, as Katta does not disclose the determination of a dynamic range of the sample as discussed above, Katta cannot therefore disclose the selection of a number of LSBs of the

sample to scramble in accordance with the sample's dynamic range, as claimed by Applicants.

Does Katta disclose scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples?

Katta discloses scrambling that affects the entire signal, not just selected LSBs of each sample which make up a signal. Therefore, Katta does not disclose or suggest scrambling selected LSBs while preserving a number of MSBs in each sample.

Does Katta disclose that the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable?

Katta does disclose scrambling of signals to such a degree that descrambling and reproduction by unauthorized parties is not completely disabled, but is disabled to the extent that the content of unauthorized reproduction data is partially but not completely discernable (Col. 2, lines 7-13). The Examiner misinterprets this passage of Katta as stating: "Once scrambled, the data is partially but not completely discernable (Col. 2, line 13)." (final Office Action, page 3, paragraph 4).

In Katta, if an unauthorized party is able to descramble the signal, the signal reproduced by descrambling will be only partially discernable. This is because the dummy information, which has been inserted into the MPEG header of the scrambled signal in place of the original meta data, conveys slightly different information about the decoding parameters of the MPEG stream, such as a quantization width which is different from that

used during the original quantization process (Col. 2, lines 35-50).

Contrary to the Examiner's assertions, in Katta, it is the descrambled signal that is only partially discernable to an unauthorized party. In contrast, in Applicants' claimed invention, it is the scrambled samples that are degraded but still recognizable.

Therefore, Katta does not disclose or remotely suggest that a selected number of LSBs are scrambled in each sample such that the scrambled samples are degraded but still recognizable.

As Katta does not disclose each and every element of the invention as claimed in claim 1, the rejection of claim 1 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra.*

Applicants note that claim 23 is an apparatus claim which corresponds to the method of claim 1, and the arguments set forth above in connection with claim 1 apply equally to claim 23. Therefore, as claim 1 is patentable, claim 23 is believed to be patentable for the same reasons.

(8)(1.4) Discussion Of Final Office Action And Claim 3

Claim 3 specifies: *wherein the samples are provided in successive frames, comprising the further step of:*

adaptively selecting the number of LSBs to be scrambled in each sample according to the frame thereof.

Does Katta disclose that samples to be scrambled are provided in successive frames?

The portion of Katta relied on by the Examiner in rejecting claim 3, column 3, lines 29-30, does disclose that the video signal may be processed by either field unit or frame unit. However, as discussed above in connection with claim 1, Katta does not refer to scrambling individual samples of data that comprise the signal, rather Katta discloses introducing additional information into the metadata portion of the file (which is wrapped around the content signal), in order to dupe the decoding apparatus into producing a scrambled version of the signal upon unauthorized decoding attempts.

Therefore, Katta does not disclose or suggest that the samples to be scrambled are provided in successive frames of the samples.

Does Katta disclose adaptively selecting the number of LSBs to be scrambled in each sample according to the frame thereof?

Applicants' claim 3 specifies that the number of selected LSBs to be scrambled is adaptively determined according to the frame of the sample. This selection parameter is in addition to the selection of the LSBs based on the dynamic range of the sample set forth in claim 1.

Katta discloses only that the video signal may be processed on a frame or field basis. There is no disclosure or suggestion in Katta of adaptively selecting the number of LSBs to be scrambled in each sample according to the frame of the sample, as set forth in Applicants' claim 3.

As Katta does not disclose each and every element of the invention as claimed in claim 3, the rejection of claim 3 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.5) Claim 3 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 3 sets forth the novel and unobvious feature of adaptively selecting the number of LSBs to be scrambled in each sample according to the frame thereof. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.6) Discussion of Final Office Action and Claim 5

Claim 5 specifies: *in said scrambling step, the number of LSBs are scrambled within the same sample using intra-sample scrambling.*

Does Katta disclose that in the scrambling step, the number of LSBs are scrambled within the same sample using intra-sample scrambling?

The Examiner has not pointed to any particular portion of Katta which discloses scrambling selected LSBs of a digital sample using intra-sample scrambling. In fact, the Examiner has not separately addressed claim 5 in the final Office Action.

With Applicants' invention according to claim 5, the selected LSBs are scrambled using intra-sample scrambling. In other words, as shown in Figure 2a, the LSBs $S1_0$-$S1_4$ are scrambled within the same sample. Three MSBs $S1_5$-$S1_7$ are not scrambled (i.e., the position of these bits is maintained in the scrambled sample)(specification, page 13, line 27 through page 14, line 9).

Katta does not disclose or remotely suggest that a selected number of LSBs are scrambled within the same sample using intra-sample scrambling, as set forth in Applicants' claim 5.

As Katta does not disclose each and every element of the invention as claimed in claim 5, the rejection of claim 5 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.7) Claim 5 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 5 sets forth the novel and unobvious feature of scrambling the selected number of LSBs within the same sample using intra-sample scrambling. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.8) Discussion Of Final Office Action And Claim 7

Claim 7 is an independent claim that recites the following steps:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said scrambling step, the selected number of LSBs are scrambled between different samples, and within the same sample, using inter-sample and intra-sample scrambling, respectively.

The determining step, the adaptively selecting step and the scrambling step of claim 7 are identical to the corresponding steps of claim 1. As discussed above in connection with claim 1, Katta does not disclose or remotely suggest any of these claimed steps.

Does Katta disclose that, in said scrambling step, the selected number of LSBs are scrambled between different samples, and within the same sample, using inter-sample and intra-sample scrambling, respectively?

The Examiner has not pointed to any particular portion of Katta which discloses scrambling selected LSBs of a digital sample between different samples, and within the same sample, using inter-sample scrambling and intra-sample scrambling. In fact, the Examiner has not separately addressed claim 7 in the final Office Action.

As discussed above in connection with claim 5, Katta does not disclose or remotely suggest inter-sample scrambling as claimed by Applicants. Further, Katta does not disclose or remotely suggest inter-sample scrambling of LSBs. With inter-sample scrambling, LSBs from one digital sample are exchanged with LSBs from another digital sample (specification, page 14, line 19 through page 15, line 3; Figure 2c).

Accordingly, as Katta does not disclose or remotely suggest either inter-sample scrambling or inter-sample scrambling, Katta cannot be interpreted as disclosing a scrambling scheme employing both intra and inter-sample scrambling, as claimed by Applicants in claim 7.

As Katta does not disclose each and every element of the invention as claimed in claim 7, the rejection of claim 7 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.9) Claim 7 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 7 sets forth the novel and unobvious feature of scrambling the selected number of LSBs between different samples, and within the same sample, using inter-sample scrambling and intra-sample scrambling, respectively. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.10) Discussion Of Final Office Action And Claim 8

Claim 8 is an independent claim that recites the following steps:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said scrambling step, the selected number of LSBs are scrambled between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight.

The determining step, the adaptively selecting step and the scrambling step of claim 8 are identical to the corresponding steps of claim 1. As discussed above in connection with claim 1, Katta does not disclose or remotely suggest any of these claimed steps.

Does Katta disclose that, in said scrambling step, the selected number of LSBs are scrambled between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight?

The Examiner has not pointed to any particular portion of Katta which discloses scrambling selected LSBs of a digital sample between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight. In fact, the Examiner has not separately addressed claim 8 in the final Office Action.

With Applicants' invention according to claim 8, the selected LSBs are scrambled using inter-sample scrambling by interchanging bits having the same weight. In other words, a bit

of one sample may be exchanged with a bit of a different sample which has the same weight (i.e., the same bit position).

Applicants' Figures 2b and 2c illustrate inter-sample scrambling as set forth in Claim 8. For example, bit $S1_0$ of sample 200 and bit $S3_0$ of sample 270 are exchanged, bit $s1_2$ of sample 200 and bit $S2_2$ of sample 260 are exchanged, etc., to form scrambled samples, 200', 260' and 270' (page 14, lines 10-19; Figures 2b and 2c).

Katta does not disclose or remotely suggest scrambling a selected number of LSBs between different samples of a digital signal using horizontal inter-sample scrambling by interchanging bits having the same weight, as claimed by Applicants in claim 8.

As Katta does not disclose each and every element of the invention as claimed in claim 8, the rejection of claim 8 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.11) Claim 8 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 8 sets forth the novel and unobvious feature of scrambling the selected number of LSBs between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.12) Discussion Of Final Office Action And Claim 9

Claim 9 specifies the further step of: *embedding the scrambling key, at least in part, into the scrambled samples for use at a decoder in descrambling the scrambled samples.*

Does Katta disclose embedding the scrambling key, at least in part, into the scrambled samples for use at a decoder in descrambling the scrambled samples?

The Examiner refers to column 6, lines 51-59 of Katta as disclosing the subject mater of claim 9 (final Office Action, page 3, paragraph 4). This portion of Katta merely indicates that the scramble data generated by the scramble data generator 100 (Figure 1) includes the scramble key Ks, and the key Ks is used to select a number for the random number generator 7.

With Applicants' claimed invention as set forth in claim 9, the scramble key is at least partially embedded in the scrambled samples. By embedding the key in the digital samples, the key is concealed within the samples themselves and thus can be securely conveyed to the decoder for use in descrambling the samples.

Katta is directly to the contrary. As shown in Figure 1B of Katta, the key Ks is separately conveyed to the scramble position detector 8 at the descrambling apparatus, while the scrambled signal is separately conveyed to delay 12 and position detector 8 of the descrambling apparatus.

There is no disclosure or suggestion in Katta of embedding the scramble key Ks in the scrambled data and sending it to the decoder for use in descrambling, a claimed by Applicants in claim 9.

As Katta does not disclose each and every element of the invention as claimed in claim 9, the rejection of claim 9 under

35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.13) Claim 9 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claims 9 sets forth the novel and unobvious feature of embedding the scrambling key, at least in part, into the scrambled samples for use at a decoder in descrambling the scrambled samples. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.14) Discussion Of Final Office Action And Claim 10

Claim 10 depends on claim 9, and specifies: *the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a previous frame of samples.*

Does Katta disclose that the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a previous frame of samples?

The Examiner has relied on the same portion of Katta (Col. 6, lines 51-59) in rejecting claim 10 as he relied on in rejecting claim 9 (final Office Action, page 3, paragraph 4). As discussed above in connection with claim 9, the scrambling key Ks is conveyed to the descrambling device separate and apart from the scrambled signal; the key Ks is not embedded in any part of the scrambled signal of Katta.

Katta does not disclose or remotely suggest that the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a previous frame of samples.

As Katta does not disclose each and every element of the invention as claimed in claim 10, the rejection of claim 10 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.15) Claim 10 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 10 sets forth the novel and unobvious feature of embedding the scrambling key, at least in part, into a previous frame of samples. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.16) Discussion Of Final Office Action And Claim 11

Claim 11 depends on claim 9, and specifies: *the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a current frame of samples.*

Does Katta disclose that the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a current frame of samples?

The Examiner has relied on the same portion of Katta (Col. 6, lines 51-59) in rejecting claim 11 as he relied on in rejecting claim 9 (final Office Action, page 3, paragraph 4). As

discussed above in connection with claim 9, the scrambling key Ks is conveyed to the descrambling device separate and apart from the scrambled signal; the key Ks is not embedded in any part of the scrambled signal of Katta.

Katta does not disclose or remotely suggest that the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a current frame of samples.

As Katta does not disclose each and every element of the invention as claimed in claim 11, the rejection of claim 11 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.17) Claim 11 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claims 11 sets forth the novel and unobvious feature of embedding the scrambling key, at least in part, into a current frame of samples. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.18) Discussion Of Final Office Action And Claim 12

Independent method claim 12 is directed towards a method for descrambling scrambled samples which recites the following steps:

- *determining a dynamic range defined by a most significant non-zero data bit of each sample; and*

- *adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;*
- *descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:*
- *the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.*

Does Katta disclose the steps of Applicants' claim 12?

Claim 12 is a descrambling method that corresponds to the scrambling method of claim 1. The Examiner did not point to any particular portions of Katta which mention descrambling. In fact, the Examiner did not separately address claim 12 in the final Office Action.

As discussed above, the signal of Katta is not scrambled using the steps set forth in claim 1. Accordingly, this signal cannot be descrambled using the corresponding descrambling steps set forth in Applicants' claim 12. Therefore, the arguments set forth above in connection with the steps of claim 1 apply equally to the corresponding descrambling steps of claim 12.

In Katta, the scrambled signal is decoded using signals sm1, sm2, and key Ks, which are communicated to the scramble position detector 8 at the descrambling apparatus (Figure 1B). The way in which the scrambled signal is descrambled in Katta using signals sm1, sm2, and Ks is analogous to the way in which it is scrambled using this data (see, e.g., Col. 12 "Descrambling Apparatus").

There is no disclosure or suggestion in Katta that the descrambling apparatus determines a dynamic range of the scrambled sample. Further, there is no disclosure or suggestion that the descrambling apparatus of Katta selects a number of LSBs to be descrambled in each sample according to the dynamic range of the sample. There is also no disclosure or suggestion in Katta of descrambling a selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples. As discussed above in connection with claim 1, Katta does not disclose or remotely suggest that the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.

As Katta does not disclose each and every element of the invention as claimed in claim 12, the rejection of claim 12 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

Applicants note that claim 24 is an apparatus claim which corresponds to the method of claim 12, and the arguments set forth above in connection with claim 12 apply equally to claim 24. Therefore, as claim 12 is patentable, claim 24 is believed to be patentable for the same reasons.

(8)(1.19) Claim 12 Is Separately Patentable From Claim 1

Although claim 12 is a method claim directed towards descrambling scrambled samples with steps which correspond to the method for scrambling set forth in claim 1, claim 12 is separately patentable as it includes novel and unobvious subject matter not included in claim 1. For example, where claim 1

determines the dynamic range of samples to be scrambled, claim 12 determines the dynamic range of scrambled samples. In addition, where claim 1 selects a number of LSBs to be scrambled in accordance with the dynamic range of the sample, claim 12 selects a number of LSBs to be descrambled according to the dynamic range. Finally, claim 1 is directed towards scrambling the selected LSBs, while claim 12 is directed towards descrambling the selected LSBs. This additional subject matter provides significant new features that Applicants submit is independently patentable, as evidenced by the fact that these features are neither disclosed nor suggested by the prior art.

(8)(1.20) Discussion Of Final Office Action And Claim 14

Claim 14 depends from claim 12 and specifies: *wherein the samples are provided in successive frames, comprising the further step of:*

adaptively selecting the number of LSBs to be descrambled in each sample according to the frame thereof.

Does Katta disclose adaptively selecting the number of LSBs to be descrambled in each sample according to the frame thereof?

Claim 14 sets forth a descrambling method that corresponds to the scrambling method set forth in claim 3. As discussed above in connection with claim 3, Katta does not disclose adaptively selecting the number of LSBs to be scrambled in a sample in accordance with a frame thereof. Accordingly, Katta does not disclose or remotely suggest a corresponding descrambling method where the number of LSBs to be descrambled are selected according to a frame of the sample.

As Katta does not disclose each and every element of the invention as claimed in claim 14, the rejection of claim 14 under

35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra.*

(8)(1.21) Claim 14 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 14 sets forth the novel and unobvious feature of adaptively selecting the number of LSBs to be descrambled in each sample according to the frame thereof. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.22) Discussion Of Final Office Action And Claim 16

Claim 16 is dependent on claim 12 and specifies: *in said descrambling step, the number of LSBs are descrambled within the same sample using intra-sample descrambling.*

Does Katta disclose that, in said descrambling step, the number of LSBs are descrambled within the same sample using intra-sample descrambling?

The Examiner has not pointed to any particular portion of Katta as disclosing that the number of LSBs are descrambled within the same sample using intra-sample descrambling. In fact, the Examiner has not separately addressed claim 16 in the final Office Action.

As claimed by Applicants, intra-sample descrambling is used to descramble a sample which was scrambled using intra-sample scrambling. Intra-sample scrambling is described above in

connection with claim 5. To descramble a sample using intra-sample descrambling, the selected LSBs are rearranged within the same sample to provide a descrambled sample.

Katta does not disclose or remotely suggest descrambling the number of LSBs within the same sample using intra-sample descrambling, as set forth in Applicants' claim 16.

As Katta does not disclose each and every element of the invention as claimed in claim 16, the rejection of claim 16 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.23) Claim 16 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 16 sets forth the novel and unobvious feature of descrambling the number of LSBs within the same sample using intra-sample descrambling. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.24) Discussion Of Final Office Action And Claim 18

Claim 18 is an independent method claim directed to a method for descrambling which recites the following steps:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;

descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said descrambling step, the selected number of LSBs are descrambled between different samples, and within the same sample, using inter-sample and intra-sample descrambling, respectively.

The determining step, the adaptively selecting step, and the descrambling step of claim 18 are identical to the corresponding steps of claim 12. As discussed above in connection with claim 12, Katta does not disclose or remotely suggest any of these claimed steps.

Does Katta disclose that, in said descrambling step, the selected number of LSBs are descrambled between different samples, and within the same sample, using inter-sample and intra-sample descrambling, respectively?

The Examiner has not pointed to any particular portion of Katta which discloses descrambling selected LSBs of a digital sample between different samples, and within the same sample, using inter-sample descrambling and intra-sample descrambling, respectively. In fact, the Examiner has not separately addressed claim 18 in the final Office Action.

As discussed above in connection with claim 16, Katta does not disclose or remotely suggest intra-sample descrambling.

Further, Katta does not disclose or remotely suggest inter-sample descrambling. In inter-sample descrambling (which corresponds to inter-sample scrambling discussed above in connection with claim 7) the selected LSBs are interchanged among different samples to provide corresponding descrambled samples.

Katta does not disclose or remotely suggest a descrambling scheme wherein a selected number of LSBs are descrambled between different samples, and within the same sample, using inter-sample and intra-sample descrambling, respectively, as claimed by Applicants.

As Katta does not disclose each and every element of the invention as claimed in claim 18, the rejection of claim 18 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.25) Claim 18 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 18 sets forth the novel and unobvious feature of descrambling the selected number of LSBs between different samples, and within the same sample, using inter-sample scrambling and intra-sample scrambling, respectively. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.26) Discussion Of Final Office Action And Claim 19

Claim 19 is an independent claim directed to a descrambling method that recites the following steps:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;

descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said descrambling step, the selected number of LSBs are descrambled between different samples using horizontal inter-sample descrambling by interchanging bits having the same weight.

The determining step, the adaptively selecting step and the descrambling step of claim 19 are identical to the corresponding steps of claim 12. As discussed above in connection with claim 12, Katta does not disclose or remotely suggest any of these claimed steps.

Does Katta disclose that, in said descrambling step, the selected number of LSBs are descrambled between different samples using horizontal inter-sample descrambling by interchanging bits having the same weight?

The Examiner has not pointed to any particular portion of Katta which discloses descrambling selected LSBs of a digital

sample between different samples using horizontal inter-sample descrambling by interchanging bits having the same weight, respectively. In fact, the Examiner has not separately addressed claim 19 in the final Office Action.

Horizontal inter-sample scrambling is discussed above in connection with claim 8. Horizontal inter-sample descrambling is analogous to the corresponding scrambling method of claim 8. In particular, a bit of one scrambled sample may be exchanged with a bit of a different scrambled sample which has the same weight (i.e., the same bit position) in order to provide corresponding descrambled samples.

There is no disclosure or remote suggestion of horizontal inter-sample descrambling in Katta, wherein the number of selected LSBs are descrambled by interchanging bits having the same weight, as claimed by Applicants in claim 19.

As Katta does not disclose each and every element of the invention as claimed in claim 19, the rejection of claim 19 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.27) Claim 19 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 19 sets forth the novel and unobvious feature of descrambling the selected number of LSBs between different samples using horizontal inter-sample descrambling by interchanging bits having the same weight. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that

this feature is neither disclosed nor suggested by the prior art.

(8)(1.28) Discussion Of Final Office Action And Claim 20

Claim 20 depends on claim 12 and specifies:

wherein the scrambling key is embedded into the scrambled samples, comprising the further step of:

recovering the scrambling key from the scrambled samples for use in said descrambling step.

As discussed above in connection with claim 9, Katta does not disclose or remotely suggest embedding the scrambling key Ks into samples of the scrambled signal. The scramble key Ks of Katta is sent separately to the descrambling apparatus, and thus is not recovered from a scrambled sample, as claimed by Applicants in claim 20.

Katta does not disclose or remotely suggest recovering an embedded scrambling key from the scrambled samples for use in said descrambling step.

As Katta does not disclose each and every element of the invention as claimed in claim 20, the rejection of claim 20 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra.*

(8)(1.29) Claim 20 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 20 sets forth the novel and unobvious feature of recovering an embedded scrambling key from the scrambled samples for use in said descrambling step. This additional subject matter provides a significant new feature that Applicants submit is

independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.30) Discussion Of Final Office Action And Claim 21

Claim 21 depends on claim 12 and specifies:

The scrambling key for a current frame of scrambled samples is embedded into a previous frame of samples.

Does Katta disclose that the scrambling key for a current frame of scrambled samples is embedded into a previous frame of samples?

Claim 21 corresponds to claim 10. As discussed above in connection with claim 10, Katta does not disclose or remotely suggest embedding the scrambling key for a current frame of scrambled samples is embedded into a previous frame of samples, as claimed by Applicant in claim 21.

As Katta does not disclose each and every element of the invention as claimed in claim 21, the rejection of claim 21 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.31) Claim 21 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 21 sets forth the novel and unobvious feature of embedding the scrambling key for a current frame of scrambled samples is embedded into a previous frame of samples. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by

the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.32) Discussion Of Final Office Action And Claim 25

Claim 25 is dependent on claim 1 and specifies:

in said scrambling step, the number of LSBs are scrambled between different samples using inter-sample scrambling.

Does Katta disclose that, in said scrambling step, the number of LSBs are scrambled between different samples using inter-sample scrambling?

The Examiner has not pointed to any particular portion of Katta that discloses scrambling a number of LSBs between different samples using inter-sample scrambling. In fact, the Examiner has not separately addressed claim 25 in the final Office Action.

As discussed above in connection with independent claim 7, Katta does not disclose or remotely suggest scrambling a number of LSBs between different samples using inter-sample scrambling.

As Katta does not disclose each and every element of the invention as claimed in claim 25, the rejection of claim 25 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8)(1.33) Claim 25 Is Separately Patentable From Claim 1

As discussed above, the subject matter of claim 1 is patentable. In addition to the patentable subject matter of claim 1, claim 25 sets forth the novel and unobvious feature of scrambling a number of LSBs between different samples using

inter-sample scrambling. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(8)(1.34) Discussion Of Final Office Action And Claim 26

Claim 26 is dependent on claim 12 and specifies:

in said descrambling step, the number of LSBs are descrambled between different samples using inter-sample descrambling.

Does Katta disclose that, in said descrambling step, the number of LSBs are descrambled between different samples using inter-sample descrambling?

The Examiner has not pointed to any particular portion of Katta that discloses descrambling a number of LSBs between different samples using inter-sample descrambling. In fact, the Examiner has not separately addressed claim 26 in the final Office Action.

As discussed above in connection with independent claim 18, Katta does not disclose or remotely suggest descrambling a number of LSBs between different samples using inter-sample descrambling, as claimed by Applicants in claim 26.

As Katta does not disclose each and every element of the invention as claimed in claim 26, the rejection of claim 26 under 35 U.S.C. § 102(e) is believed to be improper, and withdrawal of the rejections is respectfully requested. See, *Akamai Technologies Inc., supra*.

(8) (1.35) Claim 26 Is Separately Patentable From Claim 12

As discussed above, the subject matter of claim 12 is patentable. In addition to the patentable subject matter of claim 12, claim 26 sets forth the novel and unobvious feature of descrambling a number of LSBs between different samples using inter-sample descrambling. This additional subject matter provides a significant new feature that Applicants submit is independently patentable, as evidenced by the fact that this feature is neither disclosed nor suggested by the prior art.

(9) CONCLUSION

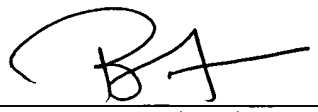
As discussed in detail above, Katta does not disclose or remotely suggest Applicants' claimed scrambling and descrambling techniques. In particular, there is no disclosure or suggestion in Katta regarding the determination of a dynamic range of each sample of digital content. The dynamic range is a property of the data sample that is defined by a most significant data bit of the data sample.

Further, Katta does not disclose or remotely suggest selecting a number of LSBs of the samples to be scrambled (or descrambled) in accordance with the determined dynamic range of each sample, as claimed by Applicants.

In addition, there is no disclosure in Katta of scrambling selected LSBs of each sample and preserving a number of most significant bits (MSBs) for each sample so that the scrambled samples are degraded but still recognizable.

In view of the above, reversal of the rejections set forth in the Final Office Action is respectfully requested.

Respectfully submitted,



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(10) APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

The claims involved in the appeal, namely claims 1, 3-5, 7-12, 14-16, and 18-26, are as follows:

1. A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.

2. (Cancelled).

3. The method of claim 1, wherein the samples are provided in successive frames, comprising the further step of:

adaptively selecting the number of LSBs to be scrambled in each sample according to the frame thereof.

4. The method of claim 1, wherein:

said scrambling key is a pseudo-random scrambling key.

5. The method of claim 1, wherein:

in said scrambling step, the number of LSBs are scrambled within the same sample using intra-sample scrambling.

6. (Cancelled).

7. A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs

in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said scrambling step, the selected number of LSBs are scrambled between different samples, and within the same sample, using inter-sample and intra-sample scrambling, respectively.

8. A method for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range determined therefor;

scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said scrambling step, the selected number of LSBs are scrambled between different samples using horizontal inter-sample scrambling by interchanging bits having the same weight.

9. The method of claim 1, comprising the further step of:

embedding the scrambling key, at least in part, into the scrambled samples for use at a decoder in descrambling the scrambled samples.

10. The method of claim 9, wherein:

the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a previous frame of samples.

11. The method of claim 9, wherein:

the scrambling key for a current frame of scrambled samples is embedded, at least in part, into a current frame of samples.

12. A method for descrambling previously scrambled digital samples of content, wherein each sample includes a plurality of

bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;

descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.

13. (Cancelled).

14. The method of claim 12, wherein the samples are provided in successive frames, comprising the further step of:

adaptively selecting the number of LSBs to be descrambled in each sample according to the frame thereof.

15. The method of claim 12, wherein:

said scrambling key is a pseudo-random scrambling key.

16. The method of claim 12, wherein:

in said descrambling step, the number of LSBs are descrambled within the same sample using intra-sample descrambling.

17. (Cancelled).

18. A method for descrambling previously scrambled digital samples of content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;

descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said descrambling step, the selected number of LSBs are descrambled between different samples, and within the same sample, using inter-sample and intra-sample descrambling, respectively.

19. A method for descrambling previously scrambled digital samples of content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising the steps of:

determining a dynamic range defined by a most significant non-zero data bit of each sample; and

adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range determined therefor;

descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable; and

in said descrambling step, the selected number of LSBs are descrambled between different samples using horizontal inter-sample descrambling by interchanging bits having the same weight.

20. The method of claim 12, wherein the scrambling key is embedded into the scrambled samples, comprising the further step of:

recovering the scrambling key from the scrambled samples for use in said descrambling step.

21. The method of claim 20, wherein:

the scrambling key for a current frame of scrambled samples is embedded into a previous frame of samples.

22. The method of claim 12, comprising the further steps of:

scrambling the scrambling key after descrambling the scrambled sample in said descrambling step.

23. An apparatus for protecting digital samples of content from illicit use by scrambling the content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising:

a range detector/mask generator for determining a dynamic range defined by a most significant non-zero data bit of each sample and adaptively selecting a number of LSBs to be scrambled in each sample according to the dynamic range thereof;

a scrambler for scrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding scrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.

24. An apparatus for descrambling previously scrambled digital samples of content, wherein each sample includes a plurality of bits, ranging from least significant bits (LSBs) to most significant bits (MSBs), comprising:

a range detector/mask generator for determining a dynamic range defined by a most significant non-zero data bit of each sample and adaptively selecting a number of LSBs to be descrambled in each sample according to the dynamic range thereof;

a descrambler for descrambling the selected number of LSBs in each sample according to a scrambling key, while preserving a number of MSBs in each sample, to provide corresponding descrambled samples; wherein:

the selected number of LSBs is scrambled in each sample such that the scrambled samples are degraded but still recognizable.

25. A method in accordance with claim 1, wherein:

in said scrambling step, the number of LSBs are scrambled between different samples using inter-sample scrambling.

26. A method in accordance with claim 12, wherein:

in said descrambling step, the number of LSBs are descrambled between different samples using inter-sample descrambling.